

Application No. 10/776,613

Amendments to the Claims:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A load drive circuit, comprising:

a drive switching element for switching ~~ONen~~ and ~~OFFeff~~ a load current that is provided between a load and a power source;

a gate drive circuit for ~~en/eff~~ driving ON and OFF of the drive switching element;

an input circuit for detecting ~~anen~~ operation state of an external switch;

a protection circuit for switching, in response to when the input circuit ~~detecting~~detects ~~en the operation state~~ of the external switch as being ON, the gate drive circuit to be in an ON state, and for controlling, in accordance with at least one of an overcurrent status and an overheat status, the gate drive circuit to protect the load drive circuit; and

a current blocking switching element for blocking, in response to the input circuit detecting the operation state of the external switch as being OFF ~~when a signal inputted from the switch to the input circuit is OFF~~, a current flowing to the gate drive circuit, the current blocking switching element being provided in at least ~~oneany~~ of a path between the gate drive circuit and the power source and a path between the gate drive circuit and a ground.

2. (Currently Amended) A load drive circuit, comprising:

a drive switching element for switching ~~ONen~~ and ~~OFFeff~~ a load current that is provided between a load and a power source;

a gate drive circuit for ~~en/eff~~ driving ON and OFF of the drive switching element;

an input circuit for detecting ~~anen~~ operation state of an external switch;

a protection circuit for switching, in response to when the input circuit ~~detecting~~detects ~~en the operation state~~ of the external switch as being ON, the gate drive circuit to be in an ON

Application No. 10/776,613

state, and for controlling, in accordance with at least one of an overcurrent status and an overheat status, the gate drive circuit to protect the load drive circuit; and

a current blocking switching element for blocking, in response to the input circuit detecting the operation state of the external switch as being OFF~~when a signal inputted from the switch to the input circuit is OFF~~, a current flowing to the protection circuit, the current blocking switching element being provided in at least one~~any~~ of a path between the protection circuit and the power source and a path between the protection circuit and a ground.

3. (Currently Amended) The load drive circuit according to claim 1, further comprising:

~~another~~ a current blocking switching element for blocking, in response to the input circuit detecting the operation state of the external switch as being OFF~~when a signal inputted from the switch to the input circuit is OFF~~, a current flowing to the protection circuit, the current blocking switching element being provided in at least one~~any~~ of a path between the protection circuit and the power source and a path between the protection circuit and ~~the~~ ground.

4. (Currently Amended) A load drive circuit, comprising:

a drive switching element for switching ON~~en~~ and OFF~~eff~~ a load current that is provided between a load and a power source;

a gate drive circuit for ~~en/eff~~ driving ON and OFF~~of~~ the drive switching element;

an input circuit for detecting ~~an~~ operation state of an external switch;

a protection circuit for switching, in response to~~when~~ the input circuit ~~detecting~~~~detects~~ on the operation state of the external switch as being ON, the gate drive circuit to be in an ON state, and for controlling, in accordance with at least one of an overcurrent status and an overheat status, the gate drive circuit to protect the load drive circuit;

Application No. 10/776,613

an overcurrent detection circuit for detecting an overcurrent to output a detection result to the protection circuit; and

a current blocking switching element for blocking, in response to the when a signal inputted from the switch to the input circuit detecting the operation state of the external switch as being OFF, a current flowing to the overcurrent detection circuit, the current blocking switching element being provided in at least one of a path between the overcurrent detection circuit and the power source and a path between the overcurrent detection circuit and a ground.

5. (Currently Amended) The load drive circuit according to claim 1, further comprising:

an overcurrent detection circuit for detecting an overcurrent to output a detection result to the protection circuit; and

~~another~~ a current blocking switching element for blocking, in response to the input circuit detecting the operation state of the external switch as being OFF ~~when a signal inputted from the switch to the input circuit is OFF~~, a current flowing to the overcurrent detection circuit, the current blocking switching element being provided in at least one of a path between the overcurrent detection circuit and the power source and a path between the overcurrent detection circuit and ~~the~~ a ground.

6. (Currently Amended) The load drive circuit according to claim 2, further comprising:

an overcurrent detection circuit for detecting an overcurrent to output a detection result to the protection circuit; and

~~another~~ a current blocking switching element for blocking, in response to the input circuit detecting the operation state of the external switch as being OFF ~~when a signal inputted from the switch to the input circuit is OFF~~, a current flowing to the overcurrent detection

Application No. 10/776,613

circuit, the current blocking switching element being provided in at least one of a path between the overcurrent detection circuit and the power source and a path between the overcurrent detection circuit and the ground.

7. (Currently Amended) The load drive circuit according to claim 3, further comprising:

an overcurrent detection circuit for detecting an overcurrent to output a detection result to the protection circuit; and

another current blocking switching element for blocking, in response to the input circuit detecting the operation state of the external switch as being OFF ~~when a signal inputted from the switch to the input circuit is OFF~~, a current flowing to the overcurrent detection circuit, the current blocking switching element being provided in at least one of a path between the overcurrent detection circuit and the power source and a path between the overcurrent detection circuit and the ground.

8. (Currently Amended) A load drive circuit, comprising:

a drive switching element for switching ON ~~en~~ and OFF ~~eff~~ a load current that is provided between a load and a power source;

a gate drive circuit for ~~en/eff~~ driving ON and OFF of the drive switching element;

an input circuit for detecting on operation of an external switch;

a protection circuit for switching, in response to when the input circuit detecting the detects-on operation state of the external switch as being ON, the gate drive circuit to be in an ON state, and for controlling, in accordance with at least one of an overcurrent status and an overheat status, the gate drive circuit to protect the load drive circuit;

an overheat detection circuit for detecting the overheat status to output the detection result to the protection circuit; and

Application No. 10/776,613

a current blocking switching element for blocking, in response to the when a signal inputted from the switch to the input circuit detecting the operation state of the external switch as being OFF, a current flowing to the overheat detection circuit, the current blocking switching element being provided in at least oneany of a path between the overheat detection circuit and the power source and a path between the overheat detection circuit and a ground.

9. (Currently Amended) The load drive circuit according to claim 1, further comprising:

an overheat detection circuit for detecting the overheat status to output a detection result to the protection circuit; and

another current blocking switching element for blocking, in response to the input circuit detecting the operation state of the external switch as being when a signal inputted from the switch to the input circuit is OFF, a current flowing to the overheat detection circuit, the current blocking switching element being provided in at least oneany of a path between the overheat detection circuit and the power source and a path between the overheat detection circuit and thea ground.

10. (Currently Amended) The load drive circuit according to claim 2, further comprising:

an overheat detection circuit for detecting the overheat status to output a detection result to the protection circuit; and

another current blocking switching element for blocking, in response to the input circuit detecting the operation state of the external switch as being when a signal inputted from the switch to the input circuit is OFF, a current flowing to the overheat detection circuit, the current blocking switching element being provided in at least oneany of a path between

Application No. 10/776,613

the overheat detection circuit and the power source and a path between the overheat detection circuit and ~~the~~ a ground.

11. (Currently Amended) The load drive circuit according to claim 3, further comprising:

an overheat detection circuit for detecting the overheat status to output a detection result to the protection circuit; and

~~another~~ a current blocking switching element for blocking, in response to the input circuit detecting the operation state of the external switch as being~~when a signal inputted from the switch to the input circuit is~~ OFF, a current flowing to the overheat detection circuit, the current blocking switching element being provided in at least one~~any~~ of a path between the overheat detection circuit and the power source and a path between the overheat detection circuit and ~~the~~ a ground.

12. (Currently Amended) The load drive circuit according to claim 4, further comprising:

an overheat detection circuit for detecting the overheat status to output a detection result to the protection circuit; and

~~another~~ a current blocking switching element for blocking, in response to the input circuit detecting the operation state of the external switch as being OFF~~when a signal inputted from the switch to the input circuit is~~ OFF, a current flowing to the overheat detection circuit, the current blocking switching element being provided in at least one~~any~~ of a path between the overheat detection circuit and the power source and a path between the overheat detection circuit and ~~the~~ a ground.

13. (Currently Amended) The load drive circuit according to claim 5, further comprising:

Application No. 10/776,613

an overheat detection circuit for detecting the overheat status to output a detection result to the protection circuit; and

~~another~~ a current blocking switching element for blocking, in response to the input circuit detecting the operation state of the external switch as being~~when a signal inputted from the switch to the input circuit is~~ OFF, a current flowing to the overheat detection circuit, the current blocking switching element being provided in at least one~~any~~ of a path between the overheat detection circuit and the power source and a path between the overheat detection circuit and ~~the~~ ground.

14. (Currently Amended) The load drive circuit according to claim 6, further comprising:

an overheat detection circuit for detecting the overheat status to output a detection result to the protection circuit; and

~~another~~ a current blocking switching element for blocking, in response to the input circuit detecting the operation state of the external switch as being~~when a signal inputted from the switch to the input circuit is~~ OFF, a current flowing to the overheat detection circuit, the current blocking switching element being provided in at least one~~any~~ of a path between the overheat detection circuit and the power source and a path between the overheat detection circuit and ~~the~~ ground.

15. (Currently Amended) The load drive circuit according to claim 7, further comprising:

an overheat detection circuit for detecting the overheat status to output a detection result to the protection circuit; and

~~another~~ a current blocking switching element for blocking, in response to the input circuit detecting the operation state of the external switch as being~~when a signal inputted from the switch to the input circuit is~~ OFF, a current flowing to the overheat detection circuit,

Application No. 10/776,613

the current blocking switching element being provided in at least ~~one~~^{any} of a path between the overheat detection circuit and the power source and a path between the overheat detection circuit and ~~the~~^a ground.

16. (Currently Amended) A load drive circuit, comprising:
- a drive switching element for switching ~~ONen~~ and ~~OFFeff~~ a load current that is provided between a load and a power source;
 - a gate drive circuit for ~~en/off~~ driving ~~ON~~ and ~~OFF~~^{ef} the drive switching element;
 - an input circuit for detecting ~~anen~~ operation state of an external switch;
 - a protection circuit for switching, in response to when the input circuit detecting ~~detects on the operation state of the external switch as being ON~~, the gate drive circuit to be in an ON state, and for controlling, in accordance with at least one of an overcurrent status and ~~an overheat status~~, the gate drive circuit to protect the load drive circuit;
 - a current limitation circuit for causing, when a voltage decline between both ends of the drive switching element exceeds a predetermined threshold value, the both ends of the drive switching element to behave therebetween a short circuited circuit to limit the current flowing to the drive switching element; and
 - a current blocking switching element for blocking, in response to the input circuit detecting the operation state of the external switch as being ~~when a signal inputted from the switch to the input circuit is OFF~~, a current flowing to the current limitation circuit, the current blocking switching element being provided in at least ~~one~~^{any} of a path between the current limitation circuit and the power source and a path on ~~an~~^{the} output terminal side of the current limitation circuit.

17. (Currently Amended) The load drive circuit according to claim 1, further comprising:

Application No. 10/776,613

a current limitation circuit for causing, when a voltage decline between both ends of the drive switching element exceeds a predetermined threshold value, the both ends ~~to of the driving switching element to be have therebetween~~ a short circuited circuit to limit the current flowing to the drive switching element; and

~~another~~ a current blocking switching element for blocking, in response to the input circuit detecting the operation state of the external switch as being when a signal inputted from the switch to the input circuit is OFF, a current flowing to the current limitation circuit, the current blocking switching element being provided in at least ~~one~~ any of a path between the current limitation circuit and the power source and a path on ~~an~~ the output terminal side of the current limitation circuit.

18. (Currently Amended) A load drive circuit, comprising:

a drive switching element for switching ~~ON~~ and ~~OFF~~ a load current that is provided between a load and a power source;

a plurality of control sections for drive controlling of the drive switching element while protecting the drive switching element from a predetermined abnormality status; and

an input circuit for detecting ~~an~~ operation state of an external switch;

a current blocking switching element for blocking, in response to the input circuit detecting the operation state of the external switch as being when a signal inputted from the switch to the input circuit is OFF, a current flowing to the control sections, the current blocking switching element being provided in at least ~~one~~ any of a path between at least one of the control sections and the power source and a path between at least one of the control sections and a ground.